Appl. No	:	10/787,312	Confirmation No.: 4353
Applicants	:	GOROVOY, Evgeni WEISEL, Jeffrey M.	
Filed	:	February 27, 2004	
Title	:	MICROWAVE SWITCH HOUSING ASSEMBLY	
TC./A.U.	:	2817	
Examiner	:	TAKAOKA, Dean O.	
Docket No.	:	8989-20	
Customer No.	:	001059	

Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

AMENDMENT

Sir:

This Amendment/Reply is being filed simultaneously with a Request for Continued Examination and within the shortened statutory period for response to the previous Office Action with the mailing date of May 25, 2007. A Request for Continued Examination is being filed concurrently herewith. Please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims, which begins on page 3 of this paper.

Remarks/Arguments begin on page 7 of this paper.

Amendments to the Specification:

Please replace the paragraph beginning at page 10, line 1, with the following amended paragraph:

this resonator depends on the geometrical dimensions of the resonator volume that is defined by waveguide passage **110** and housing **102** wall (i.e. width, height and length). A change in one of these dimensions will alter the frequency of oscillation. The dominant modes of the oscillation are TE101, TE102 and TE201. Since the second digit of the index of these modes is "0", changes in the waveguide height will not affect the resonance frequency. However, a change in the height and/or in the width of the volume resonator will produce a change in path impedance that will cause additional reflection ~~reflect~~ of the signal and as a result degradation of the return loss. Changing the length will necessitate the increase in the length of rotor **106** that introduces increased switch size, mass and manufacturing costs.

Amendments to the Claims:

This listing of claims will replace, without prejudice, all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended): A microwave switch housing assembly for operation in a selected frequency range, comprising:

(a) a housing;

(b) a rotor rotatably mounted within said housing;

(c) at least one waveguide passage in said rotor;

(d) said housing having ports formed therein so that in a first position of said rotor, said waveguide passage connects said ports and in a second position of said rotor, said waveguide passage is unconnected to said ports;

(e) a channel formed ~~power-absorbing element located~~ within one of said housing and said rotor such that said channel ~~power absorbing element~~ is positioned adjacent to one end of said waveguide passage when said rotor is in said second position;

(f) a ~~said~~ power absorbing element positioned and secured within said channel, being capable of absorbing electromagnetic energy in said frequency range, so as to reduce the tendency of said waveguide passage to act as a volume resonator when said rotor is in said second position.

2. (currently amended): The microwave switch housing assembly of claim 1, wherein said housing has an interior opening to accommodate said rotor, said opening having a cylindrical surface, said cylindrical surface having said ~~a~~ channel therein ~~adapted to house said power absorbing element~~.

3. (original): The microwave switch housing assembly of claim 2, wherein said waveguide passage has an end opening having a selected height and width, and said channel has substantially the same height and width as said selected height and width.

4. (currently amended): The microwave switch housing assembly of claim 2, wherein said waveguide passage has two end openings, and wherein said power absorbing element ~~material~~ is positioned in said housing adjacent to at least one of said end openings when said rotor is in said second position.

5. (currently amended): The microwave switch housing assembly of claim 2, wherein said channel has a cross-section selected from the group consisting of: rectangular, cylindrical, and triangular.

6. (currently amended): The microwave switch housing assembly of claim 2, wherein said power absorbing element has a cross-section selected from the group consisting of: rectangular, cylindrical, and triangular.

7. (currently amended): The microwave switch housing assembly of claim 1, wherein said rotor has a plurality of curved outer surfaces, at least one of said curved outer surfaces having said ~~a~~ channel ~~therein adapted to house said power absorbing element~~.

8. (original): The microwave switch housing assembly of claim 7, wherein said waveguide passage has an end opening having a selected height, and said channel has a height that is substantially the same height as said selected height.

9. (currently amended): The microwave switch housing assembly of claim 7, wherein said waveguide passage has two end openings, and wherein said power absorbing

element ~~material~~ is positioned in said housing adjacent to at least one of said end openings when said rotor is in said second position.

10. (currently amended): The microwave switch housing assembly of claim 7, wherein said channel has a cross-section selected from the group consisting of: rectangular, cylindrical, and triangular.

11. (currently amended): The microwave switch housing assembly of claim 7, wherein said power absorbing element has a cross-section selected from the group consisting of: rectangular, cylindrical, and triangular.

12. (new): A microwave switch housing assembly for operation in a selected frequency range, comprising:

(a) a housing;

(b) a rotor rotatably mounted within said housing;

(c) at least one waveguide passage in said rotor;

(d) said housing having ports formed therein so that in a first position of said rotor, said waveguide passage connects said ports and in a second position of said rotor, said waveguide passage is unconnected to said ports, said housing having a channel formed therein;

(e) a power absorbing element positioned and secured within said channel, being capable of absorbing electromagnetic energy in said frequency range, said power absorbing element and channel positioned adjacent to one end of said waveguide passage and aligned therewith when said rotor is in said second position, to change the boundary conditions for said waveguide passage in said second position so as to reduce the tendency of said waveguide passage to act as a volume resonator when said rotor is in said second position.

13. (new): The microwave switch housing assembly of claim 12, wherein said housing has an interior opening to accommodate said rotor, said opening having a cylindrical surface, said cylindrical surface having said a channel.

14. (new): The microwave switch housing assembly of claim 12, wherein said waveguide passage has an end opening having a selected height and width, and said channel has substantially the same height and width as said selected height and width.

15. (new): The microwave switch housing assembly of claim 12, wherein said waveguide passage has two end openings, and wherein said power absorbing element is positioned in said housing adjacent to at least one of said end openings when said rotor is in said second position.

16. (new): The microwave switch housing assembly of claim 12, wherein said channel has a cross-section selected from the group consisting of: rectangular, cylindrical, and triangular.

17. (new): The microwave switch housing assembly of claim 12, wherein said power absorbing element has a cross-section selected from the group consisting of: rectangular, cylindrical, and triangular.

REMARKS/ARGUMENT

This Amendment/Reply is being filed simultaneously with a Request for Continued Examination and within the shortened statutory period for response to the previous Office Action with the mailing date of May 25, 2007. A Request for Continued Examination is being filed concurrently herewith. Accordingly, this Amendment/Reply is responsive to the Office Action mailed on May 25, 2007.

The specification has been amended to correct a clerical error on page 10, line 8.

Claims 1, 2, 4, 7, and 9 have been amended and claims 12-17 have been added in response to the Final Office Action. No new matter has been added by the amendments.

Claims 1 to 17, as amended, are currently pending in the application.

Claims 1 to 11 are rejected under 35 U.S.C. §102(e) in view of Hettlage et al.

The Examiner rejects claims 1 to 11 under 35 U.S.C. §102 (b) as being anticipated by Hettlage et al. (U.S. Patent No. 4,967,170). Applicant respectfully traverses this rejection.

Specifically, the Examiner states that the Hettlage et al. reference teaches a microwave switch housing assembly, in FIGS. 2 and 3, for operation in a selected frequency range, comprising: a housing (1); a rotor (2) rotatably mounted within said housing; at least one waveguide passage in said rotor; said housing having ports formed therein (A-D) so that in a first position of said rotor, said waveguide passage (3-5) connects said ports and in a second position of said rotor, said waveguide passage is unconnected to said ports (FIG. 2); a power absorbing element located within one of said housing and said rotor (10-13 or 14-17) such that said power absorbing element is positioned adjacent to

one end of said waveguide passage when said rotor is in said second position; said power absorbing element being capable of absorbing electromagnetic energy in said frequency range, so as to reduce the tendency of said waveguide passage to act as a volume resonator when said rotor is in said second position.

The Examiner argues that the slits shown at 10-13 or 14-17 are chokes that attenuate crosstalk (col. 3, lines 40 to 41), where the slits are air cavities. The Examiner further argues that air can be considered to be an absorbing material for absorbing unwanted crosstalk signals since it is capable of some degree of absorption and since the absorbing material of claim 1 is not clearly defined, either by property or by range.

In response, the Applicant has amended claims 1, 2, 4, 7, and 9, to better define claims to the embodiments of the present invention and to clarify the distinction between these embodiments and the cited prior art references.

Independent claim 1, as amended, defines a microwave switch housing assembly for operation in a selected frequency range, comprising: a housing; a rotor rotatably mounted within said housing; at least one waveguide passage in said rotor; said housing having ports formed therein so that in a first position of said rotor, said waveguide passage connects said ports and in a second position of said rotor, said waveguide passage is unconnected to said ports; a channel formed within one of said housing and said rotor such that said channel power absorbing element is positioned adjacent to one end of said waveguide passage when said rotor is in said second position; a power absorbing element positioned and secured within said channel, being capable of absorbing electromagnetic energy in said frequency range, so as to reduce the tendency of said waveguide passage to act as a volume resonator when said rotor is in said second position. Support for these amendments are provided in the disclosure at page 8, lines 13 to 23 and on page 9, lines 6 to 9 of the application as filed.

Hettlage et al. does not teach or suggest a power absorbing element positioned and secured within a channel. Hettlage et al. instead teaches chokes in the form of air-filled slits disposed between waveguide passages (10-13 or 14-17). The air that fills the slits is not capable of being positioned and secured within the slit taught by Hettlage et al., and thus cannot be considered a power absorbing element.

Furthermore, the Applicant respectfully submits that a person of ordinary skill in the art would not typically consider air to be a power absorbing material since its absorptivity is similar to that of free space, and is significantly less than that of other materials. The absorptivity of air, and in particular of a small amount of air in a small slit as taught by Hettlage et al., is such that the air absorbs less than 1% of the electromagnetic power incident upon the slit. In contrast, the absorptivity of even mediocre load materials is such that the load material absorbs 99% of the electromagnetic power incident upon the slit. Accordingly, the Applicant respectfully submits that the 35dB to 40dB of attenuation seen in the spurious signals in prior art microwave switches is not the result of absorption by air, but rather, is attenuation that results from the small physical spacing between the rotor and the housing which only allows a small portion of the power incident on a port to propagate to an adjacent port. Finally, the apparatus of Hettlage et al. and Mayer is intended for use on spacecraft and so any contribution of air is irrelevant.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference (*MPEP §2131 citing Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)*). Since Hettlage et al. does not teach a power absorbing element positioned and secured within a channel, it is respectfully submitted that Hettlage et al. cannot anticipate claim 1.

Claims 1 to 11 are rejected under 35 U.S.C. §102(e) in view of Mayer

The Examiner has further rejected claims 1 to 11 under 35 U.S.C. 102(b) as being anticipated by Mayer (US 6,218,912). Specifically, the Examiner argued that Mayer shows a nearly identical device as Hettlage et al. comprising air chokes, thus for the same reasons, absorbs some degree of the electromagnetic energy.

In response, the Applicant respectfully submits that Mayer does not anticipate claim 1 for the same reasons as present above in respect of Hettlage et al.. In particular, Mayer does not teach or suggest a power absorbing element positioned and secured within said channel. Mayer instead teaches an air-filled slit formed in either the rotor walls between waveguide passages (4), or in the housing (5), or in the ring-shaped outer surfaces (OS, OS'). The air filling the slit is not capable of being positioned and secured within said channel. Since Mayer does not describe each and every element set forth in claim 1, either expressly or inherently, it is respectfully submitted that Mayer cannot anticipate claim 1.

Accordingly, the Applicant respectfully submits that the subject matter claimed in independent claim 1, as amended, is not shown nor suggested by the Hettlage et al. or the Mayer references. It is further submitted that claims 2 to 11, recite additional patentable features that are neither taught nor suggested by the Hettlage et al. or Mayer references. Withdrawal of the Examiner's rejection in respect of claims 1 to 11, is respectfully requested.

Claims 1-11 rejected under 35 U.S.C. §103(a) in view of Spinner

The Examiner has rejected claims 1-11 under 35 U.S.C. §103(a) as being unpatentable over Spinner (G.B. Patent No. 2,250,140A) in view of Hettlage et al. or Mayer.

Specifically, the Examiner argues that, in FIGS. 4 to 6, Spinner shows a microwave switch housing assembly for operation in a selected frequency range, comprising: a housing (1); a rotor (4) rotatably mounted within said housing; at least one waveguide passage in said rotor; said housing having ports formed therein (A-D); a power absorbing element located within one of said housing and said rotor (11-14 or 41, 42) such that said power absorbing element is positioned adjacent to one end of said waveguide passage when said rotor is in a second position; said power absorbing element being capable of absorbing electromagnetic energy in said frequency range, so as to reduce the tendency of said waveguide passage to act as a volume resonator when said rotor is in said second position, where 11-14 or 41, 42 are slits or chokes which improve electrical properties (column 3, paragraph 3), and are analogous to the slits of Hettlage et al. discussed above.

The Examiner notes that Spinner does not show when the rotor is rotated in a first position of said rotor, said waveguide passage connects said ports and in a second position of said rotor, said waveguide passage is unconnected to said ports. However, the Examiner does argue that both Hettlage et al. and Mayer show a nearly identical waveguide switch comprising three channels so that in a first position of said rotor, said waveguide passage connects said ports and in a second position of said rotor, said waveguide passage is unconnected to said ports. The Examiner further argues that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the device disclosed by Spinner with the third channel disclosed by either Hettlage et al. or Mayer.

The Examiner further argues that Hettlage et al. and Mayer shows chokes incorporated into the three channel waveguides switches, and that Spinner merely adds an additional lossy dielectric material as an extension of the choke.

In response, the Applicant respectfully submits that a person of ordinary skill in the art would not be motivated to combine either Hettlage et al. or Mayer with Spinner when

trying to reduce volume resonance in a waveguide passage. Hettlage et al., Mayer and Spinner, alone or in combination, do not consider the problem of volume resonance in a waveguide passage, which is distinguishable from the problem of crosstalk that the prior art references consider. Since Hettlage et al., Mayer, and Spinner are not concerned with the same proximate problem as the present invention there can be no prima facie case of obviousness of modifying Hettlage et al. or Mayer or Spinner as suggested by the Examiner to provide the invention. In this regard see In re Pye, 148 USPQ 426, 429 (CCPA 1966) wherein the court held:

> "While, as an abstract proposition, it might be possible to select certain statements from Fikentscher a mechanically combined and with Touey to arrive at appellants' claimed combination, we find absolutely no basis for making such a combination. Neither reference is directed to the problem solved by appellants' invention, namely developing a cleaning composition for the skin having improved lubricity characteristics. In our view only appellants' specification suggests any reason for combining the teachings of the prior art but use of such suggestion is, of course, improper under the mandate of 35 U.S.C. 103. In re Schaffer, 43 CCPA 758, 229 F.2d 476, 108 USPQ 326." (emphasis added)."

Applicant submits that there is no motivation to modify either Hettlage et al. or Mayer, or Spinner to provide the invention. None of the cited references recognizes the advantages of the present invention. Without a suggestion of these advantages, Hettlage et al., Mayer and Spinner cannot be obviously modified. See In re Gordon, 221 USPQ 1125, 1127 (Federal Circuit 1984):

> "We are persuaded that the board erred in its conclusion of prima facie obviousness...The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification."

Accordingly, there is no teaching, suggestion, or motivation in any of the cited references to combine Hettlage et al. or Mayer with Spinner in order to address the problem of volume resonance in a waveguide passage.

Furthermore, while Spinner teaches the use of axial slits in the cylindrical bore of the housing and in the peripheral surface areas of the rotor (page 5), Mayer expressly teaches away from using such slits (see col. 1, ln. 66 to col. 2, ln 5; see also col. 2, ln. 21-33)), and instead teaches the use of groves in the lower and upper limiting plates of the passages of the rotor. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. (*MPEP §2141.02(vi) citing W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984)*). As such, a person of ordinary skill in the art, considering Mayer in its entirety, would not be motivated to combine Mayer and Spinner.

Comments in respect of newly added claims 12-17

Independent claim 12, newly added, defines a microwave switch housing assembly for operation in a selected frequency range, comprising: a housing; a rotor rotatably mounted within said housing; at least one waveguide passage in said rotor; said housing having ports formed therein so that in a first position of said rotor, said waveguide passage connects said ports and in a second position of said rotor, said waveguide passage is unconnected to said ports, said housing having a channel formed therein; a power absorbing element positioned and secured within said channel, being capable of absorbing electromagnetic energy in said frequency range, said power absorbing element and channel positioned adjacent to one end of said waveguide passage and aligned therewith when said rotor is in said second position, to change the boundary conditions for said waveguide passage in said second position so as to reduce the tendency of said waveguide passage to act as a volume resonator when

said rotor is in said second position. Support for this claim can be found throughout the application as filed, and in particular, page 8, lines 13 to 23 and on page 9, lines 6 to 9.

Hettlage et al. does not teach or suggest a housing having a channel located therein. Hettlage et al. instead teaches a plurality of chokes in the form of slits disposed in the rotor between waveguide passages (10-13 and 14-17).

Furthermore, Hettlage et al. does not teach or suggest a channel and a power absorbing element positioned adjacent to one end of said waveguide passage and aligned therewith when said rotor is in said second position, to change the boundary conditions for said waveguide passage in said second position so as to reduce the tendency of said waveguide passage to act as a volume resonator when said rotor is in said second position. This positioning allows the power absorbing element to act as a load at the ends of the waveguide passage that dissipates energy in the field within the cavity formed by the waveguide passage, thereby preventing it from acting as a resonator. In contrast, Hettlage et al. simply teaches chokes to attenuate crosstalk in the HF signal propagation between ports. The chokes taught by Hettlage et al. perform a different function to address a different problem. Hettlage et al. does not consider the problem of volume resonance, which is distinguishable from the known problem of crosstalk, and does not suggest changing the boundary conditions of the waveguide passage that is acting as a volume resonator by loading the ends of the waveguide passage with a power absorbing element.

Finally, for the same reasons as presented above in respect of claim 1, it is respectfully submitted that Hettlage et al. does not teach or suggest a power absorbing element positioned and secured within said channel.

For anticipation, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim." (*MPEP §2131 citing Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)*). Moreover, the elements

must be arranged as required by the claim. (*MPEP §2131 citing In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)*). Accordingly, since Hettlage et al. does not describe each and every element set forth in claim 12, either expressly or inherently, it is respectfully submitted that Hettlage et al. cannot anticipate claim 12.

The Applicant respectfully submits that Mayer does not anticipate newly added claim 12. Mayer does not teach or suggest a power absorbing element and channel positioned adjacent to one end of said waveguide passage and aligned therewith when said rotor is in said second position, to change the boundary conditions for said waveguide passage in said second position so as to reduce the tendency of said waveguide passage to act as a volume resonator when said rotor is in said second position. Mayer simply teaches cavities (4, 5, or 6) to improve isolation between ports.

Furthermore, in the case where the waveguide passageway (7, 8, or 9) is incident upon the cavity (5) formed in the housing acts, the length of the volume resonator associated with the passageway (7, 8, or 9) is effectively increased, since the cavity acts as an extension of the waveguide passage. However, the cavity (4, 5, or 6) does not reduce the tendency of the waveguide passage to act as a volume resonator. Instead, the cavity (5) simply changes the resonance frequency, which may or may not fall within the operating frequency band.

Finally, for the same reasons as presented above in respect of claim 1, it is respectfully submitted that Mayer does not teach or suggest a channel having a power absorbing element positioned and secured therein.

Since Mayer does not describe each and every element set forth in claim 12, either expressly or inherently, it is respectfully submitted that Mayer cannot anticipate claim 12.

Hettlage et al., Mayer and Spinner, alone or in combination, do not teach positioning the power absorbing element adjacent to the end of the waveguide passage in order to change the boundary conditions for said waveguide passage...so as to reduce the tendency of the waveguide passage to act as a volume resonator when said rotor is in said second position. None of the prior art references suggest the problem of the waveguide passage acting as a volume resonator and so cannot teach, suggest, or motivate a positioning of the power absorbing element so as to change the boundary conditions of the waveguide passage in order to reduce its tendency to act as a volume resonator. As noted in Applicant's prior submission, the axial slits taught by Hettlage et al. and Spinner act as short circuit's at a port in order to attenuate crosstalk between ports. They do not act as loads at the ends of the waveguide passage that reduce the tendency of the waveguide passage to act as a volume resonator. While crosstalk feeds the volume resonance, the channel and the power absorbing element are deployed in a novel and non-obvious way to produce a new mode of operation, namely that of acting as a load to change the boundary conditions at the ends of the waveguide passage in order to reduce the tendency of the waveguide passage to act as a volume resonator.

The Applicant respectfully submits that the subject matter claimed in newly added independent claim 12 is not shown nor suggested by the Hettlage et al. or the Mayer references. Furthermore, there is no teaching, suggestion, or motivation in any of the cited references to combine Hettlage et al. or Mayer with Spinner in order to address the problem of volume resonance in a waveguide passage. It is also submitted that claims 12 to 17, recite additional patentable features that are neither taught nor suggested by the Hettlage et al., Mayer, or Spinner references, alone or in combination.

Accordingly, allowance of claims 12 to 17, is respectfully requested.

In view of the foregoing, the Applicant respectfully submits that the application is now in condition for allowance. If the Examiner believes that a telephone interview would expedite allowance of the application, the Examiner is respectfully requested to contact the undersigned at (416) 364-7311.

Respectfully submitted,

GOROVOY ET AL.

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